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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

The Commissioner of Patents

Applicant: Mobius

Title: Power Combiner

S/N: 10/733,883 (a divisional application of 10/128,187)

Filing date: Dec 15, 2003

Examiner: Glenn

GAU 2817

Ref: Notice of Abandonment dated Aug 15, 2005

PETITION TO WITHDRAW HOLDING OF ABANDONMENT FILED UNDER 37

CFR 1.8(b) and MPEP 703.11

37 CFR 1.8(b) Petition to Withdraw Holding of Abandonment

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560-494-3835

Jay Chesavage

Aug 24 05 10:55a

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REMARKS

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Applicant petitions for withholding of abandonment under 37 CFR 1.8(b) in the above referenced case, for the reasons stated below:

1) In reply to the office action of Jan 27 2005 in the above referenced case, applicant responded with the attached Amendment filed under 37 CFR 1.111, which included a certificate of mailing by first class mail under 37 CFR 1.8 The amendment was mailed via first class mail in an envelope addressed to the "Commissioner of Patents" P.O. Box 1450, Alexandria, VA 22323-1450 on April 26, 2005.

2) On August 18, 2005, applicant received a notice of abandonment dated Aug 15, 2005 for failure to reply to the office action of Jan 27, 2005.

3) Applicant is filing this petition to withdraw holding of abandonment less than 2 months from mailing of notice of abandonment.

4) Statement by Agent for Applicant:

I personally executed the certificate of mailing for the above amendment, and mailed it by first class mail with the United States Postal Service on April 26, 2005.

Applicant has attached a copy of the amendment mailed as described above. Applicant requests withholding of 37 CFR 1.8(b) Petition to Withdraw Holding of Abandonment

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1 abandonment in this case and entry of the April 26, 2005
2 amendment.

3

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Respectfully Submitted,

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Jay Chesavage.

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Registration No. 39,137

37 CFR 1.8(b) Petition to Withdraw Holding of Abandonment

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I hereby certify that this correspondence is being deposited
with the United States Postal Service as first class mail in an
envelope addressed to: Commissioner for Patents; P. O. Box
1450, Alexandria, VA 22313-1450 on April 26, 2005

By [Signature] Date
4/26/05
Date of Signature

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

The Commissioner of Patents

Applicant: Mobius

Title: Power Combiner

S/N: 10/793,883 (a divisional application of 10/128,187)

Filing date: Dec 15, 2003

Examiner: Glenn

GAU 2817

Ref: Office action of Jan 27, 2005

AMENDMENT FILED UNDER 37 CFR 1.111

37 CFR 1.111 Amendment for: Power Combiner by Mobius and Ives

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In the claims:

38 (Previously presented) A power combiner having:
a central axis about which is disposed a plurality k of
cylindrical feed waveguides, each said feed waveguide having
a radius, an input port and a launching port, all centered
on a feed waveguide axis, said launching port including a
cylindrical helix;

a plurality k of focusing reflectors, one for each said
feed waveguide, each said focusing reflector centered on
said feed waveguide axis;

a final waveguide coaxial to said central axis and
collecting power reflected by each said focusing reflector
with a proximal final waveguide reflector port.

39 (Currently amended) The power combiner of claim 38
where

$(1/n) \arccos \left(\frac{p}{X_{pq}} - \frac{m}{X_{mn}} \right)$ is an integer, when

said p m = azimuthal wave number

said q n = radial wave number

said X_{pq} X_{mn} = the eigenvalue of the mode.

40 (Previously presented) The power combiner of claim
38 where said feed waveguide launch port helical section is
37 CFR 1.111 Amendment for: Power Combiner by Mobius and Ives

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1 formed by sweeping a line of length $L_{\text{feedlaunch}} = \theta * L_{\text{launch}} / 2 * \pi$
 2 at said radius from and parallel to said feed waveguide
 3 axis, where θ is the angle in radians about said feed
 4 waveguide axis and said L_{launch} is the length of the helical
 5 cut.

6
 7 41 (Previously presented) The power combiner of claim
 8 38 where said final waveguide is a cylinder.

9
 10 42 (Previously presented) The power combiner of claim
 11 38 where said feed waveguide axis is parallel to said
 12 central axis.

13
 14 43 (Previously presented) The power combiner of claim
 15 38 where each said feed waveguide radius is equal to each
 16 other said feed waveguide radius.

17
 18 44 (Previously presented) The power combiner of claim
 19 38 where at least one said feed waveguide radius is
 20 different from any other said feed waveguide radius.

21
 22 45 (Currently amended) The power combiner of claim ~~38~~
 23 40 where each said feed waveguide helical section angle $\theta = 0$
 24 is uniformly offset with respect to a plane from said
 25 central axis to said feed waveguide center axis.

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2 46 (Currently amended) The power combiner of claim 38
 3 40 where each said feed waveguide helical section angle $\theta = 0$
 4 is not uniformly offset with respect to a plane from said
 5 central axis to said feed waveguide center axis.

6

7 47 (Previously presented) The power combiner of claim
 8 38 where said feed waveguide helical launch port has a
 9 helical cut depth

$$L_{\text{feed launch}} = 2\pi \{k_{\text{par}} \sqrt{1 - (m/X_{mn})^2}\} / \{k_{\text{perp}} \cos^{-1}(m/X_{mn})\}$$

11 where

12 k_{par} is the parallel, or axial wave number

13 m is the azimuthal index of the mode in said feed
 14 waveguide

15 n is the radial index of the mode in said feed
 16 waveguide

17 X_{mn} is the eigenvalue of the mode

18 K_{perp} is the perpendicular wave number.

19

20 48 (Cancelled)

21

22 49 (Previously presented) The power combiner of claim
 23 38 where said reflector is formed by a curve extruded along
 24 said central axis, said reflector curve comprising a locus
 25 of points.

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2 50 (Previously presented) The power combiner of claim
3 49 where said locus of points satisfies the following
4 criteria for each given locus point:

5 where each said feed waveguide has a circular feed
6 caustic and a feed caustic phase front, and said final
7 waveguide has a circular final caustic and a final caustic
8 phase front, for each point on said locus, a first line
9 segment starting from said locus point, touching said feed
10 caustic and ending on said feed caustic phase front, and a
11 second line segment starting on said locus point, touching
12 said final caustic and ending on said final caustic phase
13 front:

14

15 a) the path length of said first line segment added to
16 said second line segment is a constant,

17 b) at each said locus point, an intersection point is
18 defined by the intersection of said locus point and a line
19 which is tangent to said reflector curve at said locus
20 point, and a perpendicular line which is perpendicular to
21 said tangent line at said locus point, said perpendicular
22 line bisecting the angle formed by said first line segment
23 and said second line segment.

24

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P. 8

560-494-3835

Jay Chavesage

Aug 24 05 10:56a

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1 51 (Previously presented) The power combiner of claim
2 38 where each said k reflectors, has an angular extent
3 about said central axis ~~is~~ of $360/k$ degrees.

4
5 52 (Currently amended) The power combiner of claim 38
6 where each said ~~input-waveguide~~ feed waveguide input port is
7 coupled to a source of asymmetric traveling wave power, ~~said~~
8 ~~input-power-traveling~~ which travels through each said feed
9 waveguide, ~~reflecting~~ reflects from said reflector and is
10 collected in said final waveguide.

11
12 53 (Previously presented) The power combiner of claim
13 38 where each said feed waveguide, each said reflector, and
14 said final waveguide are electrically conductive.

15
16 54 (Previously presented) The power combiner of claim
17 38 where each said feed waveguide, each said reflector, and
18 said final waveguide include an electrically conductive
19 surface.

20
21 55 (Currently amended) A power combiner comprising:
22 a plurality k of feed waveguide cylinders, each said
23 feed waveguide cylinder having a feed waveguide axis and a
24 radius, and also having a launch end which includes a
25 helical cut ramp;

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1 a cylindrical final waveguide having a central axis;
 2 a plurality said k of reflectors interposed between
 3 said feed waveguide launch end and said final waveguide,
 4 each reflector for directing wave energy from said feed
 5 waveguide cylinder to said final waveguide;
 6 where k is n integer greater than 1.

8 56 (Currently amended) The power combiner of claim 55
 9 where

10 $(1/n) \arccos \left(\frac{p}{X_{pq}} \right) \left(\frac{m}{X_{mn}} \right)$ is an integer, when
 11 said p m = azimuthal wave number
 12 said q n = radial wave number
 13 said X_{pq} X_{mn} = the eigenvalue of the mode.

15 57 (Previously presented) The power combiner of claim
 16 55 where said feed waveguide launch port helical section is
 17 formed by sweeping a line of length $L_{\text{feedlaunch}} = \theta * L_{\text{launch}} / 2 * \pi$
 18 at said radius from and parallel to said feed waveguide
 19 axis, where θ is the angle in radians about said feed
 20 waveguide axis and said L_{launch} is the length of the helical
 21 cut.

23 58 (Previously presented) The power combiner of claim
 24 55 where said feed waveguide axis is parallel to said
 25 central axis.

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2 59 (Previously presented) The power combiner of claim
3 55 where any said feed waveguide radius is equal to any
4 other said feed waveguide radius.
5

6 60 (Previously presented) The power combiner of claim
7 55 where at least one said feed waveguide radius is
8 different from any other said feed waveguide radius.
9

10 61 (Previously presented) The power combiner of claim
11 ~~55~~ 57 where each said feed waveguide helical section angle θ
12 =0 is uniformly offset with respect to a plane from said
13 central axis to said feed waveguide center axis.
14

15 62 (Previously presented) The power combiner of claim
16 ~~55~~ 57 where each said feed waveguide helical section angle θ
17 =0 is not uniformly offset with respect to a plane from said
18 central axis to said feed waveguide center axis.
19

20 63 (Previously presented) The power combiner of claim
21 55 where said feed waveguide helical launch port has a
22 helical cut depth

$$L_{\text{feedlaunch}} = 2\pi \{ k_{\text{par}} \sqrt{1 - (m/X_{\text{mn}})^2} \} / \{ k_{\text{perp}} \cos^{-1}(m/X_{\text{mn}}) \}$$

24 where

25 k_{par} is the parallel, or axial wave number

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1 m is the azimuthal index of the mode in said feed
2 waveguide

3 n is the radial index of the mode in said feed
4 waveguide

5 X_{mn} is the eigenvalue of the mode

6 K_{perp} is the perpendicular wave number.

7
8
9 64 (Previously presented) The power combiner of claim
10 55 where said reflector is formed by a curve extruded along
11 said central axis, said reflector curve comprising a locus
12 of points.

13
14 65 (Previously presented) The power combiner of claim
15 64 where said locus of points satisfies the following
16 criteria for each given locus point:

17 where each said feed waveguide has a circular feed
18 caustic and a feed caustic phase front, and said final
19 waveguide has a circular final caustic and a final caustic
20 phase front, for each point on said locus, a first line
21 segment starting from said locus point, touching said feed
22 caustic and ending on said feed caustic phase front, and a
23 second line segment starting on said locus point, touching
24 said final caustic and ending on said final caustic phase
25 front:

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2 a) the path length of said first line segment added to
3 said second line segment is a constant,

4 b) at each said locus point, an intersection point is
5 defined by the intersection of said locus point and a line
6 which is tangent to said reflector curve at said locus
7 point, and a perpendicular line which is perpendicular to
8 said tangent line at said locus point, said perpendicular
9 line bisecting the angle formed by said first line segment
10 and said second line segment.

11

12 66 (Previously presented) The power combiner of claim
13 55 where said plurality comprises k feed waveguides and k
14 reflectors, and the angular extent of each said reflector
15 about said central axis is $360/k$ degrees.

16

17 67 (Currently amended) The power combiner of claim 55
18 where each said ~~input~~ feed waveguide is coupled to a source
19 of asymmetric traveling wave power, said ~~input~~ wave power
20 traveling through each said feed waveguide, reflecting from
21 said reflector and ~~collected~~ collecting in said final
22 waveguide.

23

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Jay Chesapeake

Aug 24 05 10:58a

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68 (Previously presented) The power combiner of claim
55 where each said feed waveguide, each said reflector, and
said final waveguide are electrically conductive.

69 (Previously presented) The power combiner of claim
55 where each said feed waveguide, each said reflector, and
said reflector waveguide include an electrically conductive
surface.

70 (Currently amended) A power combiner comprising:
k feed waveguides, each said feed waveguide formed from
a 4 sided polygon conductor comprising a rectangle having a
width and height adjoining a triangle having same said
height, said polygon then rolled into a cylinder with ~~an~~ a
feed waveguide axis substantially parallel to said rectangle
width thereby forming said feed waveguide, said feed
waveguide having a feed waveguide radius about said feed
waveguide axis and a feed waveguide launch end adjacent to
said triangle;

a cylindrical final waveguide having a central axis;
a plurality said k of reflectors positioned between
said k feed waveguides and said final waveguide input end;
where k is greater than 1.

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1 71 (Currently amended) The power combiner of claim 70
2 where

3 $(1/n) \arccos \left(\frac{p}{X_{pm}} \right) \frac{(m/X_{mn})}{X_{mn}}$ is an integer, when
4 said p m = azimuthal wave number
5 said q n = radial wave number
6 said X_{pm} X_{mn} = the eigenvalue of the mode.

7
8 72 (Currently amended) The power combiner of claim 70
9 where said feed waveguide launch port helical section is
10 formed by sweeping a line of length $L_{\text{feedlaunch}} = \theta * L_{\text{launch}} / 2 * \pi$
11 at said feed waveguide radius from and parallel to said feed
12 waveguide axis, where θ is the angle in radians about said
13 feed waveguide axis and said L_{launch} is the length of the
14 helical cut.

15
16 73 (Previously presented) The power combiner of claim
17 70 where said feed waveguide axis is parallel to said
18 central axis.

19
20 74 (Previously presented) The power combiner of claim
21 70 where each said feed waveguide radius is equal to each
22 other said feed waveguide radius.

23

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75 (Currently amended) The power combiner of claim 70 where at least one said feed waveguide radius is different from any other said feed waveguide radius.

76 (Currently amended) The power combiner of claim ~~70~~ 72 where each said feed waveguide helical section angle $\theta = 0$ is uniformly offset with respect to a plane from said central axis to said feed waveguide center axis.

77 (Previously presented) The power combiner of claim ~~70~~ 72 where each said feed waveguide helical section angle $\theta = 0$ is not uniformly offset with respect to a plane from said central axis to said feed waveguide center axis.

78 (Currently amended) The power combiner of claim 70 where said feed waveguide helical launch ~~port~~ end has a helical cut depth

$$L_{\text{feedlaunch}} = 2\pi \{k_{\text{par}} \text{Sqrt}(1 - (m/X_{mn})^2) / \{k_{\text{perp}} \cos^{-1}(m/X_{mn})\}\}$$

where

k_{par} is the parallel, or axial wave number

m is the azimuthal index of the mode in said feed waveguide

n is the radial index of the mode in said feed waveguide

X_{mn} is the eigenvalue of the mode

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1 K_{perp} is the perpendicular wave number.

2

3 79 (Currently amended) The power combiner of claim 70
4 where said reflector is formed by a curve extruded along
5 said central axis, said reflector curve comprising a locus
6 of points.

7

8 80 (Currently amended) The power combiner of claim 79
9 where said locus of points satisfies the following criteria
10 for each given locus point:

11 where each said feed waveguide has a circular feed
12 caustic and a feed caustic phase front, and said final
13 waveguide has a circular final caustic and a final caustic
14 phase front, for each point on said locus, a first line
15 segment starting from said locus point, touching said feed
16 caustic and ending on said feed caustic phase front, and a
17 second line segment starting on said locus point, touching
18 said final caustic and ending on said final caustic phase
19 front:

20

21 a) the path length of said first line segment added to
22 said second line segment is a constant,

23 b) at each said locus point, an intersection point is
24 defined by the intersection of said locus point and a line
25 which is tangent to said reflector curve at said locus

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1 point, and a perpendicular line which is perpendicular to
 2 said tangent line at said locus point, said perpendicular
 3 line bisecting the angle formed by said first line segment
 4 and said second line segment.

5
 6 81 (Previously presented) The power combiner of claim
 7 70 where said plurality comprises k feed waveguides and k
 8 reflectors, and the angular extent of each said reflector
 9 about said central axis is $360/k$ degrees.

10
 11 82 (Currently amended) The power combiner of claim 70
 12 where each said ~~input~~ feed waveguide is coupled to a source
 13 of asymmetric traveling wave power, ~~said input power~~
 14 traveling through each feed waveguide, reflecting from said
 15 reflector and collected in said final waveguide.

16
 17
 18 83 (Previously presented) The power combiner of claim
 19 70 where each said feed waveguide, each said reflector, and
 20 said final waveguide are electrically conductive.

21
 22 84 (Currently amended) The power combiner of claim 70
 23 where each said feed waveguide, each said reflector, and
 24 said ~~reflector~~ final waveguide include an electrically
 25 conductive surface.

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REMARKS

This is an amendment filed under 37 CFR 1.111 and responsive to the office action dated Jan 27, 2005. Claims 38, 40-44, 47, 49-51, 53-55, 57, 59, 60, 63, 66, 68-70, 74, 81, and 83 were allowed in the office action of Jan 27, 2005.

With regard to the 35 USC 112 rejection of claims 39, 56, and 71, applicant notes that azimuthal wavenumber index p and radial wave number q are merely arbitrary variables assigned to mode indices known in the prior art of travelling wave modes, and fully defined in the specification paragraph starting on page 4 line 5. However, to exactly correspond to the specification recitation of the same formulas with m and n as indices on page 21 lines 10-16 for asymmetric travelling waves, the claims have been amended to make reference to m and n rather than p and q .

With regard to the examiner statement that \arccos term does not relate to the physical structure of the power combiner, applicant notes the penultimate sentence found on page 21 line 17-18, which notes that when the product formed on page 21 line 13 (including the constituent multiplicative \cos^{-1} term) is an integer, the final waveguide 88 can be a simple cylinder. The indices m and n reference the travelling wave

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1 modes best supported by than the structure. Reconsideration
2 is requested.

3 With regard to the 35 USC 112 rejection of claims 45,
4 46, 61, 62, 76, and 77 for lack of antecedent basis for
5 "said feed waveguide helical section angle", these dependant
6 claims now rely on dependant claims 40, 40, 57, 57, 72, 72,
7 respectively, which contain the limitation "feed waveguide
8 helical section angle".

9 With regard to the 35 USC 112 rejection of claims 52,
10 67, and 82 for lack of antecedent basis for "said input
11 waveguide" and "said input power", applicant has amended
12 these claims to make antecedent reference to "feed waveguide
13 input port" and removed the reference to "said input power".

14 With regard to the 35 USC 112 rejection of claims 58,
15 64, 73, 76, 77, and 79 for lack of antecedent basis for
16 "said central axis", this term has been amended into claims
17 55, 55, 70, 72, 72, and 70, respectively.

18 With regard to the 35 USC 112 rejection of claim 72 for
19 lack of antecedant basis for the term "said radius" and
20 "said feed waveguide axis", independant claim 70 properly
21 referenced "each said feed waveguide...rolled into a
22 cylinder with an axis". Nevertheless, claim 70 has been
23 amended to explicity reference "feed waveguide axis" and
24 "feed waveguide radius" in amended claims 70 and 72.

1 With regard to the 35 USC 112 rejection of claim 75 for
2 lack of antecedent basis for the term "said feed waveguide
3 radius", the previously referenced amendment of claim 70
4 addresses this matter.

5 With regard to the 35 USC 112 rejection of claims 76
6 and 77 for lack of antecedent basis of "said feed waveguide
7 center axis", these claims have been amended to delete the
8 word "center" and now depend on claim 72.

9 With regard to the 35 USC 112 rejection of claim 78 for
10 lack of antecedent basis for "said feed waveguide helical
11 launch port", this claim has been amended to reference the
12 "launch end" found in independent claim 70.

13 With regard to the 35 USC 112 rejection of claim 84 for
14 lack of antecedent basis for "said reflector waveguide", the
15 claim has been amended to reference "said final waveguide".

16 Reconsideration is requested for the above claims.

17

18 With this amendment, the present application is in
19 condition for allowance.

20

21 Respectfully Submitted,

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Jay Chesavage

Registration No. 39,137

37 CFR 1.111 Amendment for: Power Combiner by Mobius and Ives

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